

# BECTA

## The strategic case for adopting the Schools Interoperability Framework (SIF) within the UK

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# 1. Executive Summary

- 1.1 This document provides an outline case for the adoption of common standards and an interoperability framework in the collection and use of school and pupil data.

## **Current position**

- 1.2 A range of stakeholders and organisations are involved in the collection and use of school and pupil data including:

- Schools (Primary and Secondary)
- Local Authorities
- Funding organisations/Policy makers – e.g. DfES, Devolved Governments
- Suppliers
- NDBPs & Agencies – e.g. Ofsted, National Assessment Agency
- Awarding Bodies
- Independent schools

- 1.3 Data flows between bodies are numerous - there are over twenty different types – and can be complex. Each data flow can include different types of data such as attendance data, English as a second language, co-ordinated data admissions and information on looked after children.

- 1.4 There are a number of methods of collecting and transferring data: paper files, Excel spreadsheets, Word documents, bespoke proprietary products and products based on open source software.

- 1.5 The Government has recognised the need to streamline and simplify data collection and much progress has already been made. The Common Basic Data Set (CBDS), for example, provides a set of data definitions which offer a standard for data used in the schools education sector for management information.

- 1.6 A number of other data collection initiatives are currently receiving Government funding. They include:

- MIAP
- ISB
- COLLECT
- Data dissemination and access project

- RAISEonline
- New data collection methodology
- School workforce pilot
- UPN
- ULN
- Contact Point
- Government Connect

1.7 Whilst interoperability can help to improve the effectiveness of data flows it is clear that any implementation will need to give careful consideration to the wide range of existing initiatives in order to achieve coherent and positive benefits.

### **Benefits of an interoperability framework**

- 1.8 The implementation of an interoperable environment in the UK will have an impact upon the current data flows and the working processes associated with them. At a more strategic level, such a framework will contribute to improving integration of services, particularly multi-agency ways of working.
- 1.9 An effective interoperability framework will impact on individual daily lives: accurate data collection will mean less administrative time taken up with operational processes, teachers will have more time to teach, pupils will benefit through increased standards and a fully functioning interoperable framework will contribute to the Every Child Matters Agenda<sup>1</sup> and to efficiencies in service provision in line with the Gershon<sup>2</sup> report.
- 1.10 Interoperability is more than a technical solution and to achieve full interoperability, there must be provision for effective business and operational protocols – such as protocols around data management and data exchange - in addition to any technical requirements.
- 1.11 We illustrate, in this document, the practical benefits that have been reported from the implementation of a schools' interoperability framework in the USA. This framework includes provision for business and operational protocols as well as detailing technical requirements.

### **Options for interoperability**

- 1.12 The Government has adopted the e-GIF as its interoperability framework. e-GIF sets out the minimum set of technical policies and specifications that govern information flows across Government and the public sector. It covers interconnectivity, data integration, e-services access and content management. e-GIF commits the Government to open standards principles.
- 1.13 The Government also recognises that international standards should take preference over EU standards, and EU standards will take preference over UK standards. This is important when considering the most suitable interoperability framework for the UK schools sector.

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<sup>1</sup> [www.everychildmatters.gov.uk](http://www.everychildmatters.gov.uk)

<sup>2</sup> [http://www.hm-treasury.gov.uk/media/B2C/11/efficiency\\_review120704.pdf](http://www.hm-treasury.gov.uk/media/B2C/11/efficiency_review120704.pdf)

- 1.14 A number of standards bodies exist to develop and promote minimum standards. Each has a different remit and operates in a different way, for example:
- ISO** is the world's largest developer of standards and develops only those standards for which there is a market requirement and recommends best practice for the management and organisation (i.e. Governance) of the standards and systems
- W3C** is the membership body that establishes specifications for the web and issues the recommendations on which the World Wide Web is based
- IMS** operates through a community development of de facto standards and promotes innovation and research into best practices, including the adoption of open technical specifications for interoperable learning technology
- CEN/ ISSS** seeks to ensure that any standards reflect European needs and can be internationalised and/or localised according to these needs
- IEEE** is a leading developer of standards many of which underpin current technologies and which are largely focused in the area of technology
- SIFA** has developed open specifications including Governance arrangements to enable software applications, particularly schools administrative software, to work together more effectively.
- 1.15 In adopting interoperability framework for the UK there is also a need to consider governance and legal implications. Data sharing has legal implications for a range of regulatory compliance areas, for example, issues around data ownership and data protection. It also creates broader liability and reputational risk issues. The adoption of a schools' interoperable framework system within the UK should include an integrated provision or mechanism for addressing these issues.
- 1.16 Options to develop requirements for a UK specific schools' interoperability framework include
- Developing bespoke UK schools specific standards.
  - Working with one or more existing standards/specifications bodies or organisations to develop UK schools specific standards.
  - Adapting a school specific standard to better match UK requirements.
- 1.17 E-GIF recognises that international standards take priority over EU and UK standards, therefore the development of a bespoke UK schools specific interoperability framework in isolation from current international initiatives would not be in accordance with wider Government policy.
- 1.18 We looked at a number of standards bodies/organisations that potentially, could develop a suitable interoperability framework for the UK schools sector. Such a framework would need to meet the needs and requirements of the UK school sector, have provision for robust governance arrangements and for a transport mechanism. These requirements informed the choice of standards bodies/organisations considered.
- 1.19 We appraised a number of standards against a range of criteria<sup>3</sup> that are important

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<sup>3</sup> See Appendix A for Matrix criteria

for successful implementation of a schools' interoperability framework in the UK. The following table summarises the results of this analysis.

**Table 1: Summary of evaluation of standards against key criteria**

	ISO	W3C	IEEE	IMS	CEN/ISS	e-GIF	SIFA
<b>Internationally recognised open standards</b>	5	5	5	3	3	4	3
<b>School specific standards</b>	1	1	1	4	2	1	5
<b>Integrated governance arrangements</b>	1	4	4	2	4	2	5
<b>Data transport mechanism</b>	1	1	1	1	1	1	5
<b>Flexibility/adaptability</b>	2	5	5	4	5	4	4
<b>Neutral forum</b>	3	4	3	5	3	1	5
<b>Asynchronous/Synchronous operations</b>	1	2	1	5	1	1	5
<b>Quality systems/products</b>	5	5	5	4	4	5	4
<b>Ability to localise standards according to local need</b>	3	4	2	5	5	4	5
<b>Totals (low= 9, High=45)</b>	<b>22</b>	<b>31</b>	<b>27</b>	<b>33</b>	<b>28</b>	<b>23</b>	<b>41</b>

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- 1.20 IMS offers education specific standards although these are not aimed at the schools sector and there is no provision for MIS.
- 1.21 Currently the only standards body that develops school specific standards is SIFA. SIFA provides a holistic approach to interoperability that includes robust governance arrangements and a transport mechanism.
- 1.22 Our options appraisal shown in table 1.19 indicates that SIFA is the preferred interoperability option for developing a framework for the UK based on a range of sector specific requirements.
- 1.23 Initially developed for the US education market, SIFA is now becoming increasingly recognised as the major international standard for education data collection and transfer.
- 1.24 Its flexible and integral governance structure of elected officials includes working groups with clearly defined Terms of Reference and By-Laws. There is scope to adapt the Governance arrangements to better meet UK requirements – such as ensuring the data model is fit for UK requirements.
- 1.25 In this way the use of SIFA aims to ensure that the technical solutions are fit for purpose, are aligned with policy and end user requirements and do have a positive

impact on the school environment and the pupils' learning experience.

### **Next steps**

- 1.26 Having looked at the need for adopting interoperability arrangements in the UK and concluding that SIFA is the preferred option at this stage, we recommend a number of 'next steps'.
- 1.27 There is a need to ensure that the adoption of SIFA in the UK is fit for purpose, cost effective and that the adoption itself does not impose undue costs or additional administrative burdens.
- 1.28 We recommend that a full evaluation of SIFA use within the UK Education Sector is conducted. This evaluation should include as a minimum:
- Full cost evaluation to ensure that the costs of introduction do not negate the benefits achieved by the introduction.
  - Evaluation of ROI to ensure that benefits are a result of SIFA and not as a result of improved processes per se.
  - Governance arrangements are flexible to address any future policy changes or initiatives.
  - Governance arrangements have the ability to address any legal or compliance issues at early stages of technical and process development.
  - Demonstrated robustness.
  - Ability to articulate and deliver the solution.
- 1.29 The process of this evaluation should have:
- Clear phases of delivery.
  - Clearly identified progression routes and pathways to mitigate scope creep.
  - Delivery success parameters clearly defined.
  - External and internal communications strategy and vision.
- 1.30 A working pilot should be initiated as soon as is practical. The pilot should include a full evaluation strategy and full costing information.

## 2. Introduction

- 2.1 This paper provides a high level strategic overview of school data management from the current position to the desired future state, with the main focus on the role that improved ‘interoperability’ has to play in enabling this change.

### **School data management**

- 2.2 The UK education service increasingly benefits from, and therefore has come to rely upon, the supply of accurate and timely data. This is true for parents and pupils in terms of finding out about schools in their area, gaining a place at a chosen school and for services such as registration and school meals. It is also true for schools and their staff in terms of a wide range of processes such as supporting pupil progress, and for local and national government and agencies that deal with school funding, qualifications, admissions and planning.
- 2.3 Data relating to learners in schools is currently collected in a variety of ways and recorded using a wide range of information systems, primarily by schools, but also by local authorities as well as by other agencies such as Awarding Bodies. Schools are meanwhile increasing their use of technology in terms of information systems as well as electronic learning resources. This means there is a growing need to make links between different systems within a school, and between schools and other organisations to allow sharing of data for the benefit of the learner.
- 2.4 However, the Government recognises that there is considerable scope to improve educational data collection and sharing to obtain greater data accuracy and frequency. Streamlining the efficiency of the processes involved will add value through contributing to reductions in the overall administrative burdens.
- 2.5 If such improvements are achieved then this should provide the direct benefit of freeing up time and resources so that more resources can be placed at the ‘front-line’, focused on supporting learning and teaching. In addition, it will allow greater focus on making better use of data as meaningful information, so that local and national governments and other agencies can have better informed policies, as well as better run programmes and services. It will strengthen the ability of schools to ‘personalise’ learning for different learners and groups as well as to use the information to continuously improve themselves as organisations. As a result, learners will enjoy an enhanced learning experience.
- 2.6 A key improvement required to realise this potential is that systems must be better able to ‘talk to each other’: i.e. become interoperable.
- 2.7 The Government has already adopted the principle of using open standards wherever possible. Becta - the strategic body responsible for ICT in the education sector – published a report in 2005<sup>4</sup> that strongly recommends the use of a

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<sup>4</sup> “School Management Information Systems and Value for Money Report “ Becta June 2005

supplier independent arrangement for data sharing within the education sector.

- 2.8 Becta is now working closely with the DfES and other partners to develop operational and technical standards on interoperability. This work includes looking at the various open standards interoperability options available to determine the feasibility of an interoperability arrangement for data sharing within the education sector.
- 2.9 This document provides an outline strategic case for adopting common standards and the need for interoperability in the education sector. It concludes with a recommendation for the preferred option of an interoperability framework suitable for the UK education sector and will outline associated costs of that option.

### Interoperability

- 2.10 Interoperability can mean different things to different people.<sup>5 6 7</sup> However in the context of developing and implementing data standards for UK schools an agreed definition of what is meant by interoperability per se will assist stakeholder understanding and help ensure clarity around what can sometimes be a bewildering subject area.

- 2.11 A working definition of interoperability suitable for use within the education sector is as follows:

***“Interoperability is connecting people, data and diverse systems. The term can be defined in a technical way or in a broad way, taking into account social, political and organisational factors”<sup>8</sup>***

- 2.12 There is also a need for an agreement of what resources or information i.e. data is to be used or shared and what standards will be used to accomplish this sharing. This data interoperability can be defined as the:

***“ability to transfer data and to use data in any system in accordance with agreed protocols such that the original meanings of the data are retained irrespective of its point of access. Standardised data is critical to exchanging information accurately among widely distributed and differing users”<sup>9</sup>***

- 2.13 To implement effective and efficient methods of data collection and sharing the following issues also need to be considered:

- Scope and extent of the data that will be shared
- How to map this data across the different systems currently in use
- What technical standards and specifications will be needed and agreed
- The infrastructure implications and requirements
- Governance procedures and business protocols for the on-going management of the agreements
- Compliance issues – such as complying with data protection legislation
- Resource and funding implications of the above

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<sup>5</sup> [www.ukoln.ac.uk](http://www.ukoln.ac.uk) or the Museums, Libraries and Archives Council

<sup>6</sup> [http://www.sei.cmu.edu/str/indexes/references/IEEE\\_90.html](http://www.sei.cmu.edu/str/indexes/references/IEEE_90.html)

<sup>7</sup> <http://www.ariadne.ac.uk/issue24/interoperability/>

<sup>8</sup> <http://en.wikipedia.org/wiki/Interoperability>

<sup>9</sup> [http://www.cs.man.ac.uk/~qamarr/papers/Medinfo\\_Paper\\_RQamar.pdf](http://www.cs.man.ac.uk/~qamarr/papers/Medinfo_Paper_RQamar.pdf)

# 3. The current data sharing landscape

## Types of data

- 3.1 Existing technical and operational arrangements for collecting and sharing data between schools, Local Authorities and the DfES vary between Local Authorities.
- 3.2 Nevertheless, there are a number of agreed subjects about which data is required as well as recognised methods for facilitating the sharing of data.
- 3.3 The Common Basic Data Set (CBDS) provides a standard for data used in schools, education authorities, DfES and other software systems for management information.<sup>10</sup>
- 3.4 CBDS is a set of data definitions that can be described as a data dictionary. It is not a list of data that should be held by schools and it does not define **what** information ought to be held in any particular school's management information system (MIS) but rather the minimum type and level of information that is required (i.e. data pertaining to pupils, adults, schools and LAs)<sup>11</sup>.
- 3.5 The aim of CBDS is to enable the collection of data in a way that has minimal impact on individual schools and to give legitimate users such as DfES, Ofsted, QCA, and LAs access to this data.
- 3.6 The DfES recognises that to ensure active participation in CBDS it is necessary for the scheme to be "owned" by all education service stakeholders and not be viewed as a central government imposition.
- 3.7 In addition to CBDS, all schools are required to use the Common Transfer File (CTF)<sup>12</sup> system to transfer pupil data electronically whenever a pupil changes schools at any time during the year. The data transferred can also include attendance and assessment data. The law requires that the CTF is sent to the "new" school within 15 days of the pupil ceasing to be registered at the "old" school.

## Illustrative data flows

- 3.8 An analysis of the various data returns in primary and secondary education has identified the number and type of information flows relating to school age pupils. These data are supplied by many organisations including Awarding Bodies, Independent schools, NAA, Primary and Secondary Schools and supplied to the

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<sup>10</sup> <http://www.teachernet.gov.uk/management/ims/datamanagement/cbds/>

<sup>11</sup> <http://www.teachernet.gov.uk/management/atoz/c/commonbasicdataset/>

<sup>12</sup> <http://www.teachernet.gov.uk/management/ims/datatransfers/CTF/>

DfES, Local Authorities and in many cases, to both. All of these could potentially be impacted by the introduction of an interoperability framework and therefore the impact of these flows must be managed in any planned change programme.

3.9 The table below highlights the range of returns that currently take place and which, logically, could potentially be impacted by the introduction of an interoperability framework.

**Table 2: Summary of current data returns**

<b>Data Provider</b>	<b>Local Authority receives data</b>	<b>DfES receives data</b>	<b>Method/Format of data transfer</b>
<b>Awarding Body</b> - Daily Updates on academic qualification results	Y	Y	Proprietary
<b>Primary and Sec. Independent School</b> - Absence Return		Y	Hard Copy
<b>Independent Secondary School</b> – Annual School Census		Y	Online
<b>Local Authority</b> - Foundation Stage Profiles		Y	Character Separated Variables
<b>Local Authority</b> – PLASC		Y	XML
<b>Local Authority</b> – Key Stage 1		Y	XML
<b>National Assessment Agency</b> – Key Stage Data Feeds		Y	Fixed Field Length
<b>Primary and Sec. School</b> – Absence Returns		Y	XML
<b>Primary and Sec. School</b> – Absence and Attendance Data (Out of Area Schools)	Y		Multiple
<b>Primary and Sec. School</b> – Attendance Data	Y		Proprietary
<b>Primary and Sec. School</b> – Absence Information on LAC's	Y		Multiple
<b>Primary School</b> – Foundation Stage Profile	Y		Proprietary
<b>Primary School</b> – Foundation Stage Profile	Y		Proprietary

Data Provider	Local Authority receives data	DfES receives data	Method/Format of data transfer
<b>Primary School</b> – Racist Incidents	Y		Multiple
<b>Primary School</b> – English as an additional language form	Y		<b>Excel</b>
<b>Qualifications Curriculum Authority</b> – Key Stage Data	Y		Character Separated Variable
<b>Local Authority</b> – Coordinated data admissions	Y		XML
<b>Primary and Sec. School</b> – Annual Review of Children with Special Needs	Y		Multiple
<b>Primary and Sec. School</b> – Audit of Children with Special Needs	Y		Hard Copy
<b>Primary and Sec. School</b> – Statement of Special Education Needs	Y		Hard Copy
<b>Primary and Sec. School</b> – PLASC	Y		XML (Primary) and Online and XML (Secondary)
<b>Primary School</b> – Mini PLASC (Numbers on roll)	Y		XML
<b>Primary School</b> – Turbulence Report	Y		Hard Copy
<b>Primary School</b> – Foundation and Key Stage 1 data	Y		Proprietary
<b>Secondary School</b> – Educational Maintenance Allowance Application		Y	Hard Copy
<b>Learning Provider</b> – Looked after Child Information	Y		Multiple
<b>Awarding Body</b> – Performance Tables Data(Entry Levels Quals) Return		Y	Text File
<b>Awarding Body</b> – Performance Tables Data(Academic Quals) Return		Y	Proprietary

Data Provider	Local Authority receives data	DfES receives data	Method/Format of data transfer
<b>Awarding Body – Performance Tables Data (VRQ Quals) Return</b>		Y	Text File
<b>Awarding Body – Key Skills Data Return</b>		Y	Fixed Length Field
<b>National Assessment Agency – Key Stage Data Feeds</b>		Y	XML
<b>National Assessment Agency – Optional Key Stage Test Data Collection</b>		Y	Proprietary
<b>Learner – Youth Cohort Study</b>		Y	SPSS
<b>Learner – Longitudinal Study of Young People in England</b>		Y	SPSS
<b>Connexions – SCYGP Monthly Return</b>		Y	XML
<b>UCAS – Statistical Return</b>		Y	Character Separated Variable
<b>Awarding Body - Daily Updates on academic qualification results</b>	Y	Y	Proprietary

### Current data collection and transfer initiatives

3.10 There are also a number of ongoing initiatives concerned with the use of data collection and transfer within the education sector. These initiatives will have to be considered when planning for any changes to the management of school information and electronic data returns within an interoperability framework. Some of the initiatives that are most central to data returns are highlighted below.

- **Managing Information Across Partners<sup>13</sup> (MIAP)** is focussed on streamlining the collection and sharing of learning and achievement data within the education and skills sector through reducing the burden on schools, education and training providers. In this way MIAP will provide the learner with life-long records of their education and training. MIAP proposes to:
  - Introduce common data definitions.
  - Introduce a Unique Learner Number for every person in education and training.
  - Establish a mechanism that allows information on learners and learning to be shared and accessed.
  - Establish a UK Register of Learning Providers.

<sup>13</sup> <http://www.miap.gov.uk>

- **Information Standards Board (ISB)** The working group recently set-up by DfES will eventually have responsibility for enforcing information standards across the sector for learners and children's services.
- **COLLECT**<sup>14</sup> currently under development at the DfES, is a web-based system to collect data from schools and local authorities for the DfES. It is also intended to be used for the collection of improved data on learning aims for post-16 students in school sixth forms – this latter data will eventually be included in the School Census. COLLECT aims to become the standard tool for future DfES data collections.
- **Data Dissemination and Access Project**<sup>15</sup> This project has been set up to support the reduction of the burdens of data collection, to enable schools, Local Authorities and DfES to make best and effective use of the school and pupil data.
- **RAISEonline**<sup>16</sup> Jointly developed by Ofsted and the DfES to streamline the provision of data analysis to schools by merging the legacy Performance and Assessment Reports (the PANDA) with the Pupil Achievement Tracker (PAT). RAISEonline (Reporting and Analysis for Improvement through School self-Evaluation) is web based and will disseminate school performance data which along with validated national curriculum data will provide schools with a tool for reviewing their performance data in greater depth as part of their self evaluation and target setting.
- **New Data Collection Methodology.** In order to lessen the burden on schools and local authorities, DfES is seeking to reduce the number of surveys that it conducts. The New Data Collection Methodology is intended to achieve this goal.
- **School Workforce Pilot**<sup>17</sup> A new initiative aimed at collecting information about the school workforce is due to commence in 2010. The first pilot carried out by 35 Local Authorities is scheduled to start in January 2008. The objective is to reduce the amount of surveys carried out by various bodies and it is hoped that the SWP census will allow for the abolishment a number of existing data collection surveys.
- **Identity Management.** UPN<sup>18</sup> - The Unique Pupil Number - has existed since 1999 in English schools and is a number that identifies each pupil in England from first entry to school. The system was introduced to facilitate movement of pupil information between schools, LAs, the DfES and other central agencies<sup>19</sup>. The use of UPNs facilitates the accurate interchange of data between partners and is a key element in strengthening procedures for target setting and monitoring.

ULN<sup>20</sup> - MIAP has developed the concept of a Learner Registration Service that will support every learner and their representative(s) to access information about their achievements in education and training and enable statutory bodies to obtain the necessary data to support their functions, via a Unique Learner Number (ULN).

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<sup>14</sup> <http://www.teachernet.gov.uk/management/ims/datatransfers/COLLECT/>

<sup>15</sup> <http://www.teachernet.gov.uk/management/ims/datadiss/>

<sup>16</sup> <https://www.raiseonline.org/login.aspx?ReturnUrl=%2findex.aspx>

<sup>17</sup> <http://www.teachernet.gov.uk/management/ims/datacollections/swfcpilot/>

<sup>18</sup> <http://www.teachernet.gov.uk/docbank/index.cfm?id=9083>

<sup>19</sup> In particular, UPNs are included in data collections for end of Key Stage assessment information transmitted to and from the Qualifications and Curriculum Authority (QCA) / National Assessment Agency (NAA).

<sup>20</sup> <http://www.miap.gov.uk/uniquelearnernumbers.htm>

- **IS Index**<sup>21</sup> The Government plans to have all children's data entered onto a national index by 2008. This index will be a single, national index partitioned into 150 local authority sections. Each local authority will be responsible for running its own section. The aim is to enable practitioners delivering services to children to identify and contact one another easily and quickly, and to share relevant information about children who need services, or about whose welfare they are concerned. A central index will ensure that the system works for children who move areas or who access services from more than one authority.
  - **Government Connect**<sup>22</sup> Government Connect is an initiative between Local Authorities, the local eGovernment programme of the DCLG and the eCabinet unit of the Cabinet Office. It provides a common infrastructure for secure electronic interaction between local government, central government and citizens. Launched in March 2005, one of its principle aims is the delivery of effective and efficient children's services by promoting the secure transfer of data between authenticated parties.
- 3.11 There are considerable concerns relating to the increasing volumes of data required by the statutory process, the mechanisms through which the returns are made, the sheer amount of time and resource it takes schools and Local Authorities to collect and collate this data which is often duplicated across the systems.
- 3.12 Some data collection and transfer initiatives are applicable to England (IS Index) whilst others are UK wide (MIAP).
- 3.13 The implementation of a UK interoperability framework could potentially streamline data collection processes, allow for a reduction in the administrative burdens faced by schools and local authorities for data collections and so facilitate an increase in the accuracy of the data collected. In this way data collection will become more efficient, the data will have increased relevance and will better inform policy. Ultimately better informed policy and the associated funding will impact on the every day lives of the school workforce and pupils.

The complexity of the current landscape clearly illustrates a need for streamlining of the data collection and transfer process. This would be supported by the adoption of an interoperable framework for the schools sector. Implementation will need to be carefully linked to current initiatives as well as data flows.

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<sup>21</sup> <http://www.everychildmatters.gov.uk/index/>

<sup>22</sup> <http://www.govconnect.gov.uk/>

# 4. Stakeholders

4.1 There are a wide range of groups and individuals who are interested in and / or affected by any move towards an interoperability framework for schools.

4.2 Key groups in developing any interoperability framework are as follows:

- **Pupils and Parents:** Pupils and parents will increasingly become involved in access to pupil data. They will need to understand the reasons for, and their rights in any increases in sharing of data that relates to them. Any data sharing project therefore needs to consider the impact on this stakeholder group. (Note: the term parents in this context include guardians). More effective data sharing will have significant impact on pupils' whole school learning experience.
- **Schools:** Schools are both the 'end-users' of accurate information and the initial collectors of data. By more effective data collection they will benefit through reduced costs of collection, reduction in administrative burdens and so release revenue and staff time that can be directed towards teaching. In addition, the resultant improved data quality for schools will contribute to a significant reduction in children "falling" through the net and improve the prospects of offering 'personalised' learning.
- **Local Authorities:** LAs collate, cleanse and analyse data from all their schools and transmit cleansed data to the DfES. Through streamlining this process, the LA will expect to achieve a significant reduction in bureaucratic overheads in processing data errors, inconsistencies and changes for schools' data. The process of movement of data from school to LA to DfES and others can be automated – again reducing the bureaucratic burden on individual schools. Adopting a non-proprietary, agnostic technology which provides cost effective interoperability in a multi-supplier environment will enable the LA to procure independent 'best of breed' systems - which have the potential to work together effectively - for children's services as a whole.
- **Information Systems Suppliers:** Any proposed changes to the mechanisms for collection and sharing of data will impact the Suppliers. For example, any increases in development time caused by the changes may impact on the resource and costs incurred by Suppliers. A key ingredient of adopting an interoperable approach based on open standards is to ensure that any changes are kept to a minimum if costs are to be kept manageable.

Suppliers stand to gain a number of benefits by developing and adopting open interoperability standards. Fully interoperable products – perhaps signified by the use of Kite marks or Charter Marks – could become highly desirable and marketable in any schools sector where interoperability is an important requirement.

- **Becta:** DfES has given Becta responsibility for taking forward the 'Strategic Technologies Programme'.<sup>23</sup> As part of the Programme, Becta has the remit for and is

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<sup>23</sup> [http://partners.becta.org.uk/index.php?section=bp&catcode=\\_be\\_st\\_02](http://partners.becta.org.uk/index.php?section=bp&catcode=_be_st_02)

actively considering mechanisms for improving the way data is collected and shared both within schools and between schools and Local Authorities.<sup>24</sup>

- **Department for Education and Skills:** The DfES has a range of interests in the development of interoperability. It directly defines the nature, scope, frequency and quality standards of data required from schools. It has significant dependencies, in relation to policy development obligations and school funding requirements, on the timeliness and accuracy of the data collected via the various statutory returns and hence the need for sufficient support to ensure schools can produce such returns. In addition, it has a role in raising standards within schools.
- **NAA, OfSTED and other government bodies:** As collectors and users of school and learner data there are a range of government bodies with a strong interest. In several cases they run business critical processes which depend upon data accuracy and reliability. They will welcome the opportunity to reduce burdens and improve quality, but will need to be reassured that the risks of change have been managed.
- **Devolved Governments:** The devolved Governments face similar issues to those issues faced within the English education sector but in addition may have country specific issues or variations that will require consideration.

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<sup>24</sup> [http://www.becta.org.uk/corporate/publications/documents/mis\\_%20report\(revised-for-web\).pdf](http://www.becta.org.uk/corporate/publications/documents/mis_%20report(revised-for-web).pdf)

## 5. Potential benefits of an interoperability framework in UK schools

- 5.1 We have illustrated the complexity and range of data flows between schools, LAs and the DfES. We have also described some of the main groups that have a direct role to play in shaping any interoperability framework in UK schools.
- 5.2 The implementation of an interoperable environment in the UK will have an impact upon the current data flows and the working processes associated with them. At a more strategic level, such a framework will contribute to improving integration of services, particularly multi-agency ways of working.
- 5.3 An effective interoperability framework will impact on individual daily lives: accurate data collection will mean less administrative time taken up with operational processes, teachers will have more time to teach, pupils will benefit through increased standards and a fully functioning interoperable framework will contribute to the Every Child Matters Agenda<sup>25</sup> and to efficiencies in service provision in line with the Gershon<sup>26</sup> report.

### **Evidence from adoption of an Interoperability Framework in the USA Schools system**

- 5.4 The Schools Interoperability Framework Association<sup>27</sup> has been adopted within numerous school administrative districts in the USA since the late-1990s. As a result a range of benefits have been delivered. These include:
- Improved Data – in terms of collection, recording and analysis.
  - Improved business processes.
  - Cost reductions.
  - Improvements in staff efficiency.
  - Better IT implementation and practices.
- 5.5 Educational Systemics<sup>28</sup> has recently conducted research into the ‘real-world’ benefits that have been delivered in a number of American schools that have

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<sup>25</sup> [www.everychildmatters.gov.uk](http://www.everychildmatters.gov.uk)

<sup>26</sup> [http://www.hm-treasury.gov.uk/media/B2C/11/efficiency\\_review120704.pdf](http://www.hm-treasury.gov.uk/media/B2C/11/efficiency_review120704.pdf)

<sup>27</sup> <http://www.sifinfo.org/general-overview.asp>

<sup>28</sup> <http://www.edusystemics.com/>

implemented SIFA<sup>29</sup>. These include:

- Liberty Public, in Liberty Missouri, is an example of a simple, straightforward SIFA implementation that solved an IT problem: eliminating duplicate data entry and redundant processes across two existing applications. The bulk of the benefit was realised by the IT staff and librarians. Interoperability advantages for the IT staff included reduced data entry and troubleshooting time. The librarians are now able to offer improved library services as a result of real-time data communications.
- Western Heights in Oklahoma started its implementation five years ago as an early adopter of SIFA. The Western Height SIFA solution was far-reaching, bringing benefits to all areas of the district. Most notably, benefits include increased student achievement and increased funding opportunities due to more accurate student counts. As an early adopter of SIFA, the implementation process was long and challenging but there have been demonstrated benefits which have been worth the effort.
- The Naperville SIFA implementation is a mix between the experiences of the two districts described above. It started out as an IT solution; however, the goals grew into a broader solution for data-driven decision-making as SIFA became the messaging hub for the district. While Naperville has not yet completed its first year of implementation, the expected future benefits include increased opportunities to use sophisticated data analysis to improve student performance. Naperville also predicts that when SIFA is fully implemented, it will reduce data entry time by two thirds.

5.6 Whilst there are marked differences in the way that the education sector operates in the UK, these sorts of experiences provide a positive indication of the potential impact of an interoperable framework in the UK.

5.7 By considering the American experience, and the current UK system, we can draw up a list of theoretical benefits that the different stakeholders might gain from the introduction and adoption of an interoperability framework solution. An evaluation would be required to test whether these are realised in an actual implementation.

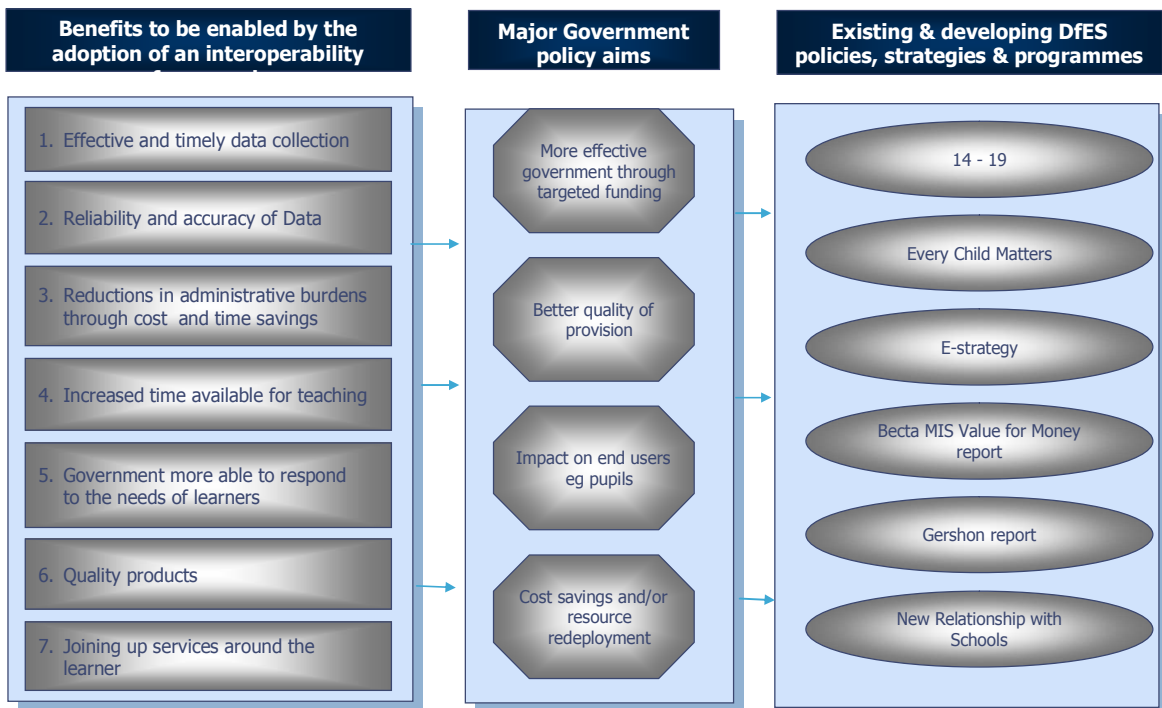
Group	Benefits
Pupils	<ul style="list-style-type: none"> <li>• Increased teaching time</li> <li>• Better access to data and applications</li> <li>• Capability to deliver improvements such as secure single sign-on</li> <li>• Easier personalisation of content and data</li> <li>• Potential improvements in performance</li> </ul>
Schools	<ul style="list-style-type: none"> <li>• Less time spent collecting data</li> <li>• More time available to analyse data to better inform school services e.g. attendance, school meals and assessment data</li> <li>• Improved data accuracy</li> <li>• Improved support and teaching time available to pupils</li> <li>• Faster and simpler reporting and data exchange with LA and DfES</li> <li>• Lower reporting costs</li> <li>• Improvements in student performance</li> <li>• Better security of data and applications</li> </ul>

<sup>29</sup> <http://www.edustructures.com/com/news/SIFROI.pdf>

Group	Benefits
Local Authorities	<ul style="list-style-type: none"> <li>• Reduction in time and resource required for data cleansing</li> <li>• Potential for multi agency approach to data sharing resulting in improved provision of services to children, pupils, learners and the wider workforce</li> <li>• More time available to analyse data to better inform policy and to target funding more appropriately</li> <li>• Easier to facilitate pupil transfer between schools</li> <li>• Fewer children “slipping through the net”</li> </ul>
Suppliers	<ul style="list-style-type: none"> <li>• Increased market share as customers seek certified products</li> <li>• Ability to develop many other aspects such as functionality, speed, ease of use and support - all of which differentiate products</li> <li>• Reduction in the range of Application Programming Interfaces (APIs) that suppliers may need to support</li> <li>• Ability to leverage data available from other applications and thereby increase the functionality they can offer</li> </ul>
DfES / Policy Makers	<ul style="list-style-type: none"> <li>• Accurate and timely data to inform policy and enable funding to be targeted at the end user in a smart way</li> </ul>

5.8 The diagram below illustrates how the different benefits of interoperability support major government policy aims, and how these in turn link to DFES policies, strategies and programmes.

### Benefits and links to policy



## 6. Options for interoperability within the UK schools sector

- 6.1 Several standards bodies exist that define standards based on open standards and which could be adopted/adapted to provide the standards for a UK schools' interoperability framework. However the adopted standards must conform to the Government's e-GiF policy.

### e-GiF

- 6.2 The UK Government has adopted the e-GiF as its interoperability framework which is at the heart of *Transformational Government*<sup>30</sup> defining the technical policies and specifications that govern information flows across the Government and Public sector.
- 6.3 e-GiF covers high level policy statements, technical policies and management, implementation and compliance regimes. It sets out the minimum set of technical policies and specifications that govern information flows across Government and the Public sector, covering interconnectivity, data integration, e-services access and content management.<sup>31</sup>
- 6.4 e-GiF, first published in September 2001 aims to free up public sector organisations allowing them to concentrate on serving the customer through value added information and services.
- 6.5 The main thrust of the e-GiF is to adopt the Internet and World Wide Web specifications for all Government systems (including interfaces). The strategic decision was taken to adopt XML and XSL<sup>32</sup> as the core standards for data integration and management i.e. open standards. In addition, the e-GiF only adopts specifications that are well supported in the market place.
- 6.6 The e-GiF architecture covers interconnectivity, data integration, content management metadata and e-services access and also informs the Open Source Software (OSS) policy.

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<sup>30</sup> <http://www.cio.gov.uk/documents/pdf/transgov/transgov-strategy.pdf>

<sup>31</sup> <http://www.govtalk.gov.uk/faq/faq.asp?section=e%2DGIF&topic=7>

<sup>32</sup> EXtensible Style Language, (XSL) is a specification for separating style from content when creating HTML or XML pages. The specifications work much like templates, allowing designers to apply single style documents to multiple pages, allowing developers to dictate the way Web pages are printed and to specify the transfer of XML documents across different applications.

- 6.7 The selection of e-GIF specifications has been driven by:
- Interoperability
  - Market support
  - Scalability
  - Openness
  - Flexibility
  - International standards
- 6.8 Preference will be given to standards with the broadest remit, so appropriate International standards will take preference over EU standards, and EU standards will take preference over UK standards.
- 6.9 The Government is committed to ensuring that these policies and specifications are kept aligned to the changing requirements of the public sector and to the evolution of the market and technology<sup>33</sup>.
- 6.10 Internal Government Compliance issues are determined by the e-Government Unit - Technology Policy<sup>34</sup>. The e-GIF team also monitor compliance through the Interoperability Working Group and other liaison groups.
- 6.11 Government has determined that home grown standards defer to EU adopted standards and that in turn internationally adopted standards take precedence. This ensures standards are maintained, up to date and relevant to the global technology economy. This is a key factor in determining which standard is recommended to Becta.

### **Standards bodies and organisations**

#### ***International Standards Organisation (ISO)*** <sup>35</sup>

- 6.12 ISO is the world's largest developer of standards. It is non governmental organisation that comprises a network of 157 countries which develops requirements in partnership with the sectors and end users.
- 6.13 It recognises the growing importance of certification and accreditation in international business transactions, global trade and regulatory requirements as well as their importance in safeguarding consumers and making lives simpler.
- 6.14 ISO develops only those standards for which there is a market requirement and recommends best practice for the management and organisation (i.e. Governance) of the standards and systems.
- 6.15 Governance arrangements are cumbersome and slow. There is no link between the development of standards, the associated Governance and a technical solution to deliver.
- 6.16 There is no requirement to adopt the recommended governance. This is an

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<sup>33</sup> <http://www.govtalk.gov.uk/schemasstandards/egif.asp?page=1&order=title>

<sup>34</sup> email : - [govtalk@cabinet-office.gsi.gov.uk](mailto:govtalk@cabinet-office.gsi.gov.uk)

<sup>35</sup> [www.iso.org](http://www.iso.org)

important consideration when placing interoperability in the context of the UK education data sharing sector.

- 6.17 ISO standards are voluntary. As a non-governmental organisation, ISO has no legal authority to enforce their implementation although some standards, mainly those concerned with health, safety or the environment, have been adopted in some countries as part of their regulatory framework.
- 6.18 ISO standards are not designed with the education sector in mind.
- 6.19 Key benefits of adopting ISO standards are:
- Internationally recognised
  - High quality

### **World Wide Web Consortium (W3C)** <sup>36</sup>

- 6.20 The international W3C is the membership body that issues the recommendations and develops web standards on which the World Wide Web is based.
- 6.21 W3C does not produce standards; rather it establishes specifications for the web, such as HTML<sup>37</sup>, XML<sup>38</sup>, and RDF<sup>39</sup>. It is not an accredited body but its specifications constitute industry standards. W3C creates specifications at a lower level than IMS described below.
- 6.22 Since 1994, W3C has published more than ninety guidelines referred to as “W3C Recommendations”. Recommendations are developed by working groups drawn from members and invited experts, and voted upon by members. All current work must pass a rigorous test of at least two independent implementations before being voted upon by the membership.
- 6.23 Most W3C work revolves around the standardisation of Web technologies by following processes that promote the development of high quality recommendations based on the consensus of the membership as well as the W3C team and members of the public.
- 6.24 Interoperability is crucial to ensure that the Web is able to reach its full potential - the most fundamental Web technologies must be compatible with one another and allow any hardware and software used to access the Web to work together. W3C refers to this goal as “Web interoperability” and encourages all interested parties to

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<sup>36</sup> [www.w3.org](http://www.w3.org)

<sup>37</sup> HTML (Hyper Text Mark-Up Language) is a collection of platform-independent authoring software (indicated by mark-up tags) that define the various components of a World Wide Web document. HTML was invented by Tim Berners-Lee while at CERN, the European Laboratory for Particle Physics in Geneva.

<sup>38</sup> XML (Extensible Mark-up Language) is a simple and flexible text format that was originally designed to meet the challenges of large-scale electronic publishing. XML is now playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere.

<sup>39</sup> RDF (Resource Description Framework) is a general framework for describing a Web site's metadata (i.e. data that is used to describe other data), or the information about the information on the site. RDF provides interoperability between applications that exchange machine-understandable information on the Web. RDF details information such as a site's sitemap, the dates of when updates were made, keywords that search engines look for and the Web page's intellectual property rights.

participate in a vendor-neutral forum for the creation of Web Recommendations.

6.25 There is no link between the development and Governance arrangements and a technical solution for delivery.

6.26 Key benefits of adopting W3C include:

- International reputation
- Relatively quick process – which provides a degree of flexibility

#### **IMS<sup>40</sup>**

6.27 The IMS is the Instructional Management System of the Global Learning Consortium, a global, non-profit, member organisation.

6.28 Although not formal standards, several IMS specifications have become worldwide de facto standards (i.e. non formal standards) for delivering learning products and services.

6.29 IMS operates through a community development of de facto standards and promotes innovation and research into best practices, including the adoption of open technical specifications for interoperable learning technology.

6.30 Members include hardware and software vendors, educational institutions, publishers, government agencies, systems integrators and multimedia content providers.

6.31 This Consortium provides a neutral forum in which members with competing business interests and different decision-making criteria collaborate – an important consideration for use within the UK education sector.

6.32 IMS specifications also include synchronous and asynchronous operations.

6.33 IMS defines and distributes open architecture interoperability specifications for e-learning products. These specifications provide a framework for interoperability which eventually may be recognised by standards bodies such as the Institute of Electrical and Electronics Engineers (IEEE).

6.34 By actively collaborating with a number of organisations, IMS ensures that their specifications have a high level of applicability across all learning domains and have global relevance.

6.35 IMS Governance arrangements are flexible and can adapt to meet changing requirements but are not sufficiently robust to ensure conformance to all aspects of compliance.

6.36 There is no link to a delivery solution.

6.37 Key benefits include:

- Global recognition
- Neutral forum – suppliers and decision makers work together towards a common goal

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<sup>40</sup> <http://www.imsglobal.org/>

- Synchronous and Asynchronous operations within the specifications

## **CEN/ISSS**

- 6.38 CEN/ISSS seeks to ensure that any standards reflect European needs and can be internationalised and/or localised according to these needs. It aims to combine the rapid process of informal specification with the security offered by the formal open consensus of traditional standardisation.
- 6.39 CEN/ISSS is an international organisation which manages the cooperation amongst the EU national standards bodies and which provides market players with a comprehensive and integrated range of standardisation services and products.
- 6.40 IMS is currently involved in consideration of a Memorandum of Understanding with CEN/ISSS and other organisations are exploring the building of a consensus for educational technology that will contribute to improved access to lifelong learning across Europe.
- 6.41 There is no link to a delivery solution.
- 6.42 Key benefits include:
- Standards that can be localised according to need
  - Increased flexibility in the approval process compared to traditional standardisation

## **IEEE<sup>41</sup>**

- 6.43 IEEE – the Institute of Electrical and Electronics Engineers - is the world's largest technical professional society, having over 360,000 members, operating in 150 countries.
- 6.44 IEEE is a leading developer of standards many of which underpin current technologies and which are largely focused in the area of technology, such as developing standards for wireless networking.
- 6.45 IEEE standards are developed through consensus in an open but formal process. The IEEE-SA Standards Board gives final approval to IEEE standards prior to publication and processes all necessary appeals.
- 6.46 IEEE also includes a patents committee that reviews any relevant patent information and ensures conformity with patent procedures and the IEEE has approved a formal set of bylaws.
- 6.47 IEEE standards are technical standards and not well suited to adapting to the education sector's needs. Significant development work would be required to adapt the process to suit the UK education environment.
- 6.48 Key benefits include:
- Internationally recognised standards
  - Formal governance

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<sup>41</sup> <http://www.ieee.org.uk/>

## **Schools Interoperability Framework Association (SIFA)<sup>42</sup>**

- 6.49 The Schools Interoperability Framework Association (SIFA) originally developed as an industry led solution response to the administrative needs of the American school system.
- 6.50 The SIFA initiative has developed open specifications including governance arrangements to enable software applications, particularly schools' administrative software, to work together more effectively. It is not a product in itself.
- 6.51 SIFA has an industry membership comprising the major MIS software suppliers, policy makers, funders and end users.
- 6.52 The active participation of the membership in the development of specifications and standards is crucial.
- 6.53 SIFA is a holistic approach that includes development of standards, governance arrangements and, crucially, a technical solution for delivery i.e. a transport mechanism.
- 6.54 This transport mechanism allows cascaded reporting and synchronised data sharing through the district, state and other levels of US Government – a mechanism that has been adapted for use internationally.
- 6.55 SIFA has evolved a fully functioning and defined Governance arrangement that includes bylaws and working groups.
- 6.56 All members - i.e. suppliers, policy makers and states/districts - participate in the development of new standards.
- 6.57 SIFA has been adopted as the key standard for schools' systems outside the USA e.g. Australia, and is being given serious consideration for adoption in many other countries including within Europe.
- 6.58 It is the only coherent international and operational interoperability standards and governance body focussed specifically at schools' MIS and VLE requirements.
- 6.59 SIFA ensures that standards development, governance arrangements and a technical transport mechanism are an integral part of the process from the very start.
- 6.60 Key benefits:
- Growing international recognition and adoption of SIFA standards
  - Integrated and holistic approach to development, governance and transport
  - The only standards body specifically aimed at addressing the education administration requirements

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<sup>42</sup> <http://www.sifinfo.org>

# 7. Governance, legal and regulatory compliance

- 7.1 Data sharing has legal implications for a range of regulatory compliance areas as well as broader liability and reputational risk management. The adoption of a schools' interoperable framework system within the UK should include an integrated provision or mechanism for addressing these issues.

## Regulatory compliance

- 7.2 **Data protection** – any handling of personal information must comply with the Data Protection Act and associated guidelines. The Data Protection Act imposes restrictions and requirements on data sharing throughout the data lifecycle.
- 7.3 Data protection legislation should not create a barrier to sensible use and sharing of data, as long as broad principles of fair and lawful processing are followed and they comply with the requirements of the other data protection principles i.e. relevant permissions are sought from individuals to permit data sharing and agreed business protocols are adhered to.
- 7.4 The framework of data protection regulation does introduce additional requirements for sensitive data (e.g. health or disability related) and information relating to minors. A UK schools' interoperability framework should ensure compliance with these requirements
- 7.5 **Disclosure obligations** – compliance with these obligations is dictated by a number of regulations, notably subject access rights under the Data Protection Act and disclosure obligations under the Freedom of Information Act.
- 7.6 To be process and cost efficient, a data sharing framework will need to have clearly identified and allocated burdens and responsibilities in respect of disclosure obligations.
- 7.7 **Statutory powers** - the ability of any particular public body to share data is impacted by the scope of its statutory authority and specific powers.
- 7.8 Different bodies and organisations have different limitations to the scope of their statutory duties, therefore a joined-up approach is required to ensure feasibility of any particular system or framework.
- 7.9 **Competition** - competition (anti-trust<sup>43</sup>) restrictions at UK and European level need to be considered in terms of supplier participation in any system or framework.
- 7.10 **Other compliance requirements** - A particular area of legislation that will have an

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<sup>43</sup> Including consideration of the anti-trust type provisions of the Enterprise Act

impact in the education sector is child protection legislation although there are other areas of regulatory compliance<sup>44</sup> that may impact information management and affect both individual players and any central organisation.

### Other areas of risk management

- 7.11 **Retention** – Retention periods may be dictated by legislation, guidelines, best practice or practical considerations such as limitation periods, commercial needs or child protection requirements.
- 7.12 **Confidentiality and duty of care** – Individual bodies and potentially any central organisation will have contractual obligations and a general duty of care to maintain confidentiality and prevent loss in addition to their statutory duties. This duty of care includes preventing disclosure to unauthorised personnel and fraudulent or otherwise unlawful use of data.
- 7.13 **Content risk** – Risk areas include accuracy, fitness for purpose, completeness, breaches of confidentiality (i.e. data containing elements which are confidential) or defamatory statements.
- 7.14 **Security of intellectual property** – Ownership and protection can be an important element of data management.
- 7.15 **Contractual obligations and risk allocation** – Obligations and therefore risk may arise from contractual obligations towards individuals or agencies wishing to access and rely on data. Obligations also arise as the result of data sharing protocols with other agencies.
- 7.16 Security of intellectual property is an important facet of security that is often overlooked and contract management - in its wider sense - is also an important part of managing data risk. **Understanding these risks is a facet of managing data risk as a whole** - through allocating risk, limiting exposure and establishing clear rules for use of data by others.
- 7.17 **New use of old identifiers** - Putting existing identifiers to new uses must be dealt with carefully, especially when obtaining specific consent of data subjects is not practicable. Specific limitations or rules around the use of such identifiers may be required by law or law-based guidance. For example there are specific restrictions imposed by the Information Commissioner on the use of the Unique Pupil Number (UPN) – linking that number to other identifiers or broader purposes is likely to be problematic.
- 7.18 The more that potential compliance steps or restrictions can be taken into account in the early stages of developing data sharing processes, tools or a framework the less risk that significant legal issues create a barrier to the use of the process or tools.
- 7.19 Standards and protocols created under a data sharing framework will be easier to implement if they are designed with the legal framework around data sharing, statutory powers and liability in mind from the start and are integral to the process. Likewise compliance and overall system efficiency will be assisted if basic legal standards are defined at the same time as the technical and process standards. These common standards can define best practice as well as define how compliance should look in practice.
- 7.20 There is a need to ensure that purposes are clearly defined and communicated.

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<sup>44</sup> These may include: HR regulations, retention of communications data and anti-terrorist legislation, the new Companies Act or other corporate governance obligations.

Generally, legitimate use of data is not problematic as long as purposes are communicated at the time of collection, those purposes are legitimate and those purposes are not exceeded.

- 7.21 A schools' interoperable framework will need to ensure that there are protocols in place to manage potential risks.

## 8. Preferred Option

8.1 We have identified a number of standards options that could be adapted to the UK education sector. We have discussed the need to consider governance and legal aspects of any solution. In the matrix below we appraise the options in order to determine a preferred option for the transfer of data within the education sector and the development of an interoperability framework appropriate to UK education needs and requirements.

8.2 The matrix assesses each of the available standards options against criteria agreed with Becta. The various options are scored on a scale of 1 -5 where 1 is low. Details of scoring criteria are contained in Appendix A.

	ISO	W3C	IEEE	IMS	CEN/ISS	e-GIF	SIFA
<b>Internationally recognised open standards</b>	5	5	5	3	3	4	3
<b>School specific standards</b>	1	1	1	4	2	1	5
<b>Integrated governance arrangements</b>	1	4	4	2	4	2	5
<b>Data transport mechanism</b>	1	1	1	1	1	1	5
<b>Flexibility/adaptability</b>	2	5	5	4	5	4	4
<b>Neutral forum</b>	3	4	3	5	3	1	5
<b>Asynchronous/Synchronous operations</b>	1	2	1	5	1	1	5
<b>Quality systems/products</b>	5	5	5	4	4	5	4
<b>Ability to localise standards according to local need</b>	3	4	2	5	5	4	5
<b>Totals (low= 9, High=45)</b>	<b>22</b>	<b>31</b>	<b>27</b>	<b>33</b>	<b>28</b>	<b>23</b>	<b>41</b>

8.3 The matrix demonstrates that when the current interoperability options are mapped against key criteria, SIFA offers the strongest potential for developing a framework for the UK.

8.4 The scoring criteria were derived from the Becta Value for Money MIS report which outlined the need for interoperability.

8.5 The approach to scoring against these criteria was carried out within the context of the Value for Money report's key recommendations, including:

*“That Becta will establish a supplier-independent and open interoperability architecture to create the opportunity for improved interoperability at the school level and at the LA or RBC level. Additionally Becta's Interoperability arrangements will draw, to the maximum extent possible, on ongoing work across Government on Interoperability standards”*

8.6 The following specific issues were also fully considered as part of the scoring process:

- Scope and extent of the data that will be shared.
- How to map this data across the different systems currently in use.
- What technical standards and specifications will be needed and agreed.
- The infrastructure implications and requirements with standards linked to a delivery solution.
- Governance procedures and business protocols for the on-going management of the agreements.
- Sufficiently robust to ensure conformance to all aspects of compliance issues – such as complying with data protection legislation.
- Fit for purpose.
- Benefits end user and has significant impact on school improvement.
- Implementation to be carefully considered (and linked) to current initiatives and data flows.
- Resource and funding implications of the above.

8.7 Based on this analysis of the 'fit' of each of the interoperability options against the agreed criteria, we recommend SIFA as the preferred option for developing an interoperability framework for the UK schools' sector.

# 9. SIFA Overview

- 9.1 The Schools Interoperability Framework Association (SIFA) is an international non-profit membership organisation. Members include suppliers, local authorities, schools, government departments and other organisations active in the schools sector. SIFA provides a neutral environment to develop specifications and standards based on platform independent and vendor neutral rules and definitions –and it is these rules and definitions that comprise the SIF Implementation Specification.
- 9.2 SIFA's goal is to make it possible for school administrators, teachers, local authorities, funders and policy makers to have access to the most current and accurate data available, through the use of an interoperability framework based on open standards.
- 9.3 The SIF implementation Specification is based on W3C and is not linked to any one particular operating system or platform. It defines the architecture requirements and communication protocols for software components and the interfaces between them.
- 9.4 The SIF Implementation Specification makes no assumption of specific hardware or software products needed to develop SIF-enabled applications and Zone Integration Server implementations. These simply need to be able to support technologies based on open standards, most prominently XML and HTTP(S).
- 9.5 The use of the implementation specification will:
- Enhance product functionality in an efficient manner.
  - Facilitate data sharing without incurring expensive customer development costs.
  - Maximise marketing opportunities to promote the best of breed approach.
  - Offers the potential to integrate a variety of solutions.
  - Facilitate the creation of leading edge education technology framework solutions.
- 9.6 The SIF Implementation Specification<sup>45</sup> defines:
- an XML-based messaging framework that allows diverse software applications to interoperate and share and report data related to entities in the school sector, specifically in schools' administrative data.

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<sup>45</sup> <http://specification.sifinfo.org/Implementation/2.0/>

- an HTTP(S)-based transport for conveying these SIF messages.
  - an abstract, platform-independent definition of a message queue for reliable delivery of asynchronous SIF messages and related synchronous administrative functions — the Zone Integration Server (ZIS).
  - an abstract, platform-independent definition of the interface between a software application and the ZIS — the SIF Agent.
- 9.7 These are known collectively as the SIF Infrastructure.
- 9.8 The SIF Implementation Specification also defines the *SIF Data Model*:
- An XML-based data model that models entities in the school administration environment as *SIF Data Objects* to be shared between applications.
- 9.9 A *SIF Zone* is a distributed system that consists of a ZIS and two or more software applications with a SIF Agent (a *SIF-enabled application*) sharing/reporting one or more SIF data objects over a network.
- 9.10 A *SIF Implementation* consists of one or more SIF Zones deployed and configured to meet customer data sharing and reporting needs.
- 9.11 Typical components that make up SIF include:
- Data Warehouse
  - Certification
  - User training
  - Residual licence costs (for agencies)

## Governance

- 9.12 SIFA Members elect officials every year for terms on the Association's Board of Directors. The Technical Board is comprised of the lead of each SIFA Working Group and Task Forces as well as four members elected "At-Large" by the membership. The SIFA Technical Board Members serve a one-year term.
- 9.13 The Governance structure ensures flexibility of approach and that the technical solutions are fit for purpose, are aligned with policy and end user requirements and do have a positive impact on the school environment and the pupils' learning experience.
- 9.14 The Governance structure is also well placed to address issues of compliance, risk management and business and operational processes and protocols at very early stages of development and ensures high standards and quality are integral to process and implementation.

## Certification

- 9.15 The SIFA certification program<sup>46</sup> is a structured SIFA program that confirms that

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<sup>46</sup> [http://certification.sifinfo.org/SIF\\_Certification\\_changes.htm](http://certification.sifinfo.org/SIF_Certification_changes.htm)

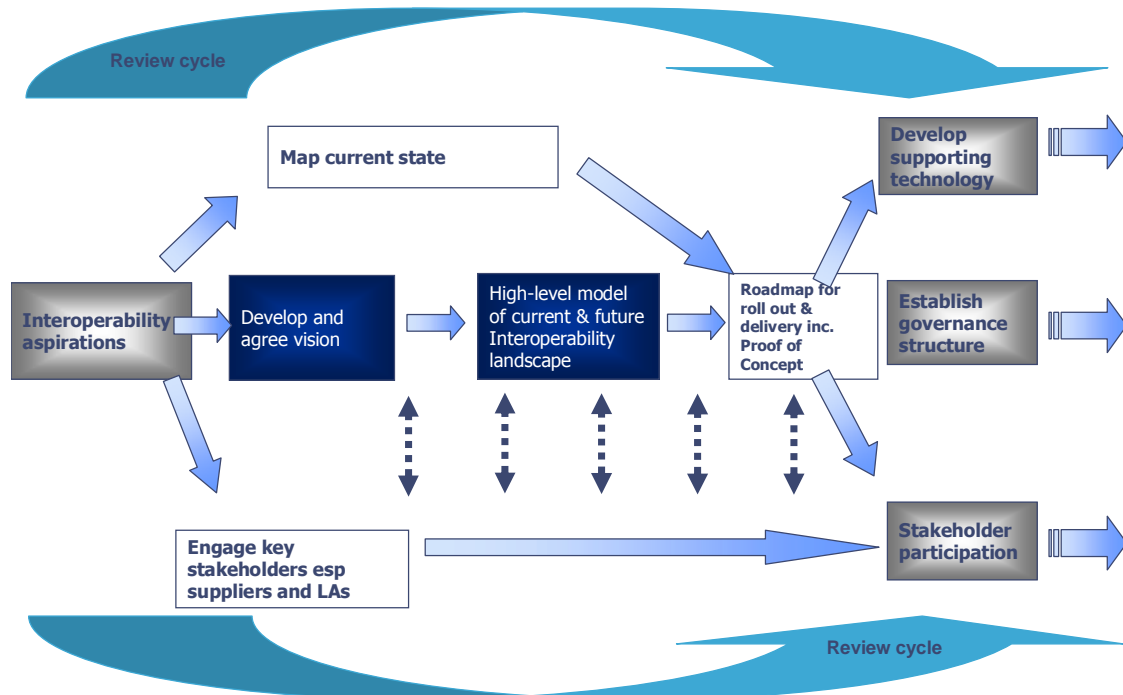
software programs adhere to the rules and definitions of the SIFA Implementation Specification. Certification offers customers guaranteed levels of quality. Administered by the Open Group, the certification program involves a series of structured tests to validate that software applications properly implement the SIFA specification.

- 9.16 Once completed, software programs are able to display the “SIFA Certified” logo on all marketing and promotional literature. The certification ensures that the software has been tested to ensure it communicates and shares information with other SIFA certified software programs.
- 9.17 Certifications are valid for 12 months to ensure quality is current.
- 9.18 Certification allows schools to purchase any certified system they choose that meets their specific requirements and not have to worry whether the different applications will work together. In this way, schools will be encouraged to adopt a whole school information system without the bother and expense of developing bespoke programming or adapting existing programmes.
- 9.19 The costs of certification apply to both members and non-members of SIFA, although non-members must pay an annual surcharge prior to commencing certification activity. This surcharge is equal to the corresponding annual SIFA membership dues based on the type of supplier and revenue level.
- 9.20 Typical Fee categories include:
  - Initial certification fee
  - Renewal fee (separate fees apply if re-testing is required)
  - Product update
  - Certification Fee for an OEM Product
  - Amendment fee
- 9.21 Fees range from \$250/£128 amendment fee to \$2,500/£1,285 for certification fee.

# 10. Next steps

- 10.1 This document has looked at the need for adopting an interoperability framework for the UK schools sector and has determined a preferred option, namely to adopt SIFA as the way forward.
- 10.2 Initially developed for the US education market, SIFA is now becoming increasingly recognised as the major international standard for education data collection and transfer.
- 10.3 The integral governance arrangements have the flexibility to be adapted to suit local requirements.
- 10.4 There remains a need to ensure that the adoption of SIFA in the UK is fit for purpose, cost effective and that the adoption itself does not impose undue costs or additional administrative burdens.
- 10.5 A full evaluation of SIFA within the UK education sector is recommended: This evaluation should include as a minimum:
- Full cost evaluation to ensure that the costs of introduction do not negate the benefits achieved by the introduction.
  - Evaluation of ROI to ensure that benefits are a result of SIFA and not as a result of improved processes per se.
  - A review of governance arrangements to determine if they are flexible to address any future policy changes or initiatives.
  - Confirmation that governance arrangements that have the ability to address any legal or compliance issues at early stages of technical and process development.
  - An assessment of the governance group's ability to articulate and deliver implementation.
- 10.6 To achieve the policy aims and to arrive at the future desired state, processes and systems will need to change regardless of the particular adopted solution. Prior to full evaluation, there is a need to clearly articulate and communicate the desired outcome to all key stakeholders and to outline drivers/barriers to achieve the goal of achieving better provision of services to meet the needs of the end users: i.e. primarily pupils, school workforce, LAs, and DfES/devolved governments.
- 10.7 These benefits will not be achieved without a sound framework underpinning these initiatives. Such a framework should include integral governance and compliance issues as well as technical solutions as illustrated in the following diagram.

## Development of an interoperability framework



10.8 Any process of introduction/roll out therefore needs to have:

- Clear phases of delivery.
- Clearly identified progression routes and pathways to mitigate scope creep.
- Delivery success parameters clearly defined.
- External and internal communications strategy and vision.

### Recommendations

10.9 Recommendation 1:

The schools interoperability framework association is the preferred option for developing an interoperability framework for the UK.

10.10 Recommendation 2:

A full evaluation of SIFA use within the UK education sector should be conducted.

10.11 Recommendation 3:

A working pilot should be initiated as soon as practical. The pilot should include a full evaluation strategy and full costing information.

# Appendix A – Summary of interoperability options appraisal process

1. The matrix below describes the current interoperability options mapped against key criteria, discussed and agreed with Becta. The key criteria have been derived from the Becta Value for Money MIS report that outlined the need for interoperability, wider Government policy and Becta specific requirements for an interoperability framework suitable for the schools sector.
2. The agreed definition of interoperability is the:

“ability to transfer data and to use data in any system in accordance with agreed protocols such that the original meanings of the data are retained irrespective of its point of access.”
3. Becta Value for Money MIS report recommendation 3 states:

“That Becta will establish a supplier-independent and open interoperability architecture to create the opportunity for improved interoperability at the school level and at the LA or RBC level. Additionally Becta’s Interoperability arrangements will draw, to the maximum extent possible, on ongoing work across Government on Interoperability standards”
4. Any adopted standard must conform to the Government’s e-GiF policy. This policy sets out the minimum set of technical policies and specifications that govern information flows across Government and the Public sector. The strategic decision was taken to adopt open standards as the core standards for data integration and management. In addition, the e-GiF only adopts specifications that are well supported in the market place.
5. e-GiF policy states that preference is given to standards with the broadest remit: Appropriate International standards will take preference over EU standards, and EU standards will take preference over UK standards.
6. Becta required that the following issues<sup>47</sup> were also considered in recommending an interoperable framework for the schools sector:
  - Scope and extent of the data that will be shared.
  - How to map this data across the different systems currently in use.
  - What technical standards and specifications will be needed and agreed.

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<sup>47</sup> Drawn from “The Strategic Case for adopting the Schools Interoperability Framework within the UK” e.g. Section 2.13

- The infrastructure implications and requirements with standards linked to a delivery solution.
- Governance procedures and business protocols for the on-going management of the agreements.
- Sufficiently robust to ensure conformance to all aspects of compliance issues – such as complying with data protection legislation.
- Fit for purpose.
- Benefits end user and has significant impact on school improvement.
- Implementation to be carefully considered (and linked) to current initiatives and data flows.
- Resource and funding implications of the above.

7. The Matrix criteria was developed as a result of these requirements and scored as follows:

1      2      3      4      5

Where 1 is a poor fit against requirements and 5 is an extremely good fit against requirements.

8. Examples of criteria scoring:

i. Internationally recognised open standards

- ISO is an internationally recognised body; its standards are known, recognised and adopted worldwide. As such ISO scores the maximum 5.
- SIFA is an international body operating in Canada, Australia and Europe as well as in the USA. However SIFA currently remains predominately American based hence scores 3.

ii. School specific standards

- IMS was developed for the HE and FE sector and does not include school specific standards. To achieve Becta's objective of developing an interoperable framework for the schools' sector, IMS specifications and standards would have to be adapted or developed for the schools sector. For this reason IMS scores 4.

iii. Integrated governance arrangements

- Governance arrangements are required to be flexible and able to adapt to meet changing requirements, however the governance must also be sufficiently robust to ensure conformance to all aspects of compliance. SIF governance arrangements have the capacity, flexibility and robustness to ensure provision is made for inclusion of compliance issues. For this reason SIF scores 5.

iv. Data transport mechanism

- For interoperability to be truly effective there must be a link to a delivery solution. SIFA is the only option that currently has that link, hence scores 5.

v. Asynchronous/Synchronous

- Synchronicity is dependent upon the transport mechanism used and the majority of the options considered do not include a transport mechanism. However some standards bodies do allow for synchronicity in their specifications. Although the actual transport mechanism may not be specified, any transport mechanism would need to comply with these standards which would need to be robust and to demonstrate a level of rigour hence IMS and SIFA score 5.

9.0 Matrix

	<b>ISO</b>	<b>W3C</b>	<b>IEEE</b>	<b>IMS</b>	<b>CEN/ISS</b>	<b>e-GIF</b>	<b>SIFA</b>
<b>Internationally recognised open standards</b>	5	5	5	3	3	4	3
<b>School specific standards</b>	1	1	1	4	2	1	5
<b>Integrated governance arrangements</b>	1	4	4	2	4	2	5
<b>Data transport mechanism</b>	1	1	1	1	1	1	5
<b>Flexibility/adaptability</b>	2	5	5	4	5	4	4
<b>Neutral forum</b>	3	4	3	5	3	1	5
<b>Asynchronous/Synchronous operations</b>	1	2	1	5	1	1	5
<b>Quality systems/products</b>	5	5	5	4	4	5	4
<b>Ability to localise standards according to local need</b>	3	4	2	5	5	4	5
<b>Totals (low= 9, High=45)</b>	<b>22</b>	<b>31</b>	<b>27</b>	<b>33</b>	<b>28</b>	<b>23</b>	<b>41</b>

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